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ABSTRACT

After an introduction concerning the mathematics teacher education program at Oklahoma State University, this document evaluates the seminars conducted in connection with this program. Two types of seminars were used. The first type consisted of interaction sessions and involved virtually no public school input. The second type was organized to provide an opportunity for interaction among mathematics student teachers and public school mathematics teachers and administrators. The second type of seminar involved public school personnel. Four of the second type of seminars were held, and both student teachers and public school personnel answered a questionnaire after each session. The topics selected included the following: (a) expectations and anxieties of mathematics student teachers, (b) discipline, (c) enrichment, and (d) evaluation. The seminars were evaluated by both student teachers and public school personnel as (a) having clearly defined objectives, (b) being well-organized, (c) being worthwhile, and (d) being something which participants would strongly recommend to future groups of teachers. (Supportive tables are included throughout the text.) (PB)

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INVOLVING PUBLIC SCHOOLS IN MATHEMATICS TEACHER EDUCATION

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INTRODUCTION

I. Background. To understand many of the remarks and comments contained in this paper, the reader should understand that Teacher Education programs at Oklahoma State University are University programs rather than programs directed by the College of Education. Specifically with regard to the mathematics teacher education program, a student may enroll in either the College of Education or the College of Arts and Sciences with the intention of becoming a secondary mathematics teacher. He is not considered to be actively pursuing the teacher education program in mathematics, however, until he has been formally admitted to Teacher Education. The admission criteria generally involves screening procedures designed to guarantee that the potential teacher is proficient in speech, that he has achieved reasonable mastery of his work in general education and that he has achieved sufficient maturity to exhibit normal personal adjustment.

II. Apprenticeship. It seems quite clear that a person desirous of becoming a secondary mathematics teacher should have the opportunity to work first-hand with secondary mathematics students and teachers prior to the student teaching experience. Such an opportunity probably will either encourage or discourage the student who is unsure of his dedication to the teaching profession. Relative to either outcome, this is a good opportunity for the student to critique his/her own interest in teaching. An ap-

SP009 165

prenticeship program was designed in cooperation with the Stillwater Public Schools for this purpose and, furthermore, with the intent of making it possible to determine the level of mathematics the student wishes to teach.

The experience is facilitated through enrollment in Field Experiences in the Secondary School, EDUC 2710. This course is offered each semester with suggested repeated enrollments, up to 3 times. A 3-hour block of time each week is needed though exceptions are made to accommodate for scheduling difficulties. The apprentice is placed with one or more secondary mathematics teacher(s) for this experience. Initially, adjustment to the school and classroom setting are of main concern. Later, the apprentice is involved in individual tutoring and small and large group instruction. (Research is presently in progress to determine if the 3-hour block of time each week is the most efficient allotment of time for both the teacher and the apprentice.)

In conjunction with the exposure to the public school, there is a one-hour weekly seminar. Discussion of public school experiences, student presentations, panel discussions, and interaction among student teachers, cooperating teachers and mathematics educators are examples of seminar activities.

Students are advised to plan a first enrollment during their sophomore years, preferably requesting an experience at the middle school level. Then a second experience during his/her Junior year at the lower secondary level. It is suggested that the final experience of this type should be at the upper secondary level during the semester before the student plans to student teach. Arranging the experience in this way enables him/her to move chronologically through the curriculum and at a rate probably commensurate to his/her mathematical maturity.

III. Student Teaching. Presently, the student teaching experience involves activities on the campus and in the public schools. The basic design is described as the "block" approach. At Oklahoma State University, this means that there is on-campus academic work during the first half of the semester and full-time public school experi-

ences during the remainder of the semester. Specifically, the on-campus courses are taken in the areas of educational psychology, foundations of education and methods of teaching mathematics in the secondary school.

Well in advance of midsemester the student has been placed with a carefully selected public school mathematics teacher who will direct his/her activities during the second half of the semester. An Oklahoma State University faculty member in mathematics education charged with supervising mathematics student teachers visits the school site several times during the experience. This practical phase of the program also involves seminars both on the Oklahoma State University campus and at the school site.

It is specifically these seminars to which the remainder of this paper is directed.

SEMINARS FOR STUDENT TEACHERS

I. Purpose. This researcher believes that increased input from public school personnel is desperately needed in teacher education programs. Typically, teacher education programs only superficially involve the public schools. Previously at Oklahoma State University, most on-campus seminars during the student teaching experience involved the mathematics student teaching supervisor and his student teachers—rarely were public school mathematics teachers or administrators present. There was some thought, however, that motivated this structure. An esprit de corps develops among the student teachers during the methods portion of the student teaching "block." These students learn many of the strengths and weaknesses of their associates through analysis of peer group presentations and open discussions of issues related to personality and self-concept. The "openness" and "esprit de corps" which develop in this group during the first half of the semester must be carefully nurtured so that solutions to real student teaching problems can be sought by the group during the second half of the semester—this peer group interaction and discussion of student teaching problems usually occurs at the biweekly seminars. The researcher has observed that these prob-

lems are not readily shared with persons outside the group. Furthermore, it is believed that an opportunity for student teachers to share their public school experiences is very desirable.

Two types of seminars emerged from these considerations.

Type A Seminars: Those on-campus seminars mentioned above which involve virtually no public school input. They serve primarily as interaction sessions. Three such seminars were conducted during the Spring Semester, 1973.

Type B Seminars: Those on-campus seminars which involve public school personnel. Suffice it to say that, at this point, the topics, timing, and participants for these seminars were carefully selected. Each Type B seminar will be carefully analyzed in the Findings portion of this paper.

Specifically, the purpose of this research was to design and implement four (4) Type B seminars for twenty-two (22) OSU secondary mathematics student teachers during the Spring Semester, 1973. It was anticipated that these seminars would provide an opportunity for interaction among mathematics student teachers and public school mathematics teachers and administrators on the selected pedagogical topics.

II. Methodology. The four topics for the Type B seminars were selected by the researcher[1] with the assistance of former mathematics student teachers. The researcher prepared a set of objectives for each seminar. These objectives were distributed to each of the public school participants and student teachers in advance of the seminar. Upon completion of each of the seminars, each participant was asked to respond to a questionnaire designed by the researcher to measure the achievement of the seminar objectives.

A cumulative questionnaire, designed by the researcher, was administered during the last Type A seminar.

III. Findings. Each Type B seminar will be discussed individually.

Seminar B-1. This seminar was conducted during the sixth week of the semester and was entitled "Expectations and Anxieties of Mathematics Student Teachers." This was

a timely seminar for these student teachers because within two weeks they would be at their student teaching locations. Seminar B-1 involved three secondary mathematics teachers, one administrator (principal) and 22 mathematics student teachers. These participants represented different geographic areas as well as different types and sizes of schools. These differences are definitely desirable as, in our situation, they represent characteristics of typical student teaching locations. Other interesting factors are that all of the mathematics teachers had previously served as cooperating teachers for OSU mathematics student teachers and that one of them would be serving as a cooperating teacher during that semester.

The specific objectives for this seminar were:

1. Identify the public schools' specific expectations of a student teacher from an administrative point of view; likewise, identify these expectations from a classroom teacher's point of view.

2. Identify the public schools' specific anxieties concerning a student teacher from an administrative point of view; likewise, identify these anxieties from a classroom teacher's point of view.

3. Identify the student teachers' expectations of the administration in the public school; likewise, identify the student teachers' expectations of the classroom teacher.

4. Identify the student teachers' anxieties as related to the administration; likewise, identify the student teachers' anxieties related to the classroom teacher.

5. Identify successful student teacher behavior patterns.

Table I summarizes the participants' responses to an evaluation form for this seminar by reporting the means of their responses. Please note that the evaluation form was constructed with a continuum for each statement. Each participant was instructed to place a check (✓) on each given continuum at the position between 0 and 10 which best described his/her feeling about that statement. Since each statement was written positively, participant responses near 0 indicate very strong disagreement with the particular statement while responses near 10 indicate very strong agreement with the statement.

TABLE I

Evaluation of Seminar B-1

Statement	Means of Responses: Public School Participants(4)	Student Teachers(22)	All Participants
1. Seminar objectives were clearly defined.	9.00	9.63	9.54
2. Administrative expectations of student teachers were clearly identified.	8.00	8.77	8.65
3. Cooperating teacher's expectations of student teachers were clearly identified.	8.50	8.95	8.88
4. Administrative anxieties concerning student teachers were clearly identified.	7.75	8.05	8.00
5. Cooperating teacher's anxieties concerning student teachers were clearly identified.	7.50	7.86	7.81
6. Student teacher's expectations concerning administration were clearly identified.	5.75	6.41	6.31
7. Student teacher's expectations concerning cooperating teachers were clearly identified.	7.25	6.55	6.65
8. Student teacher's anxieties concerning administration were clearly identified.	7.33	6.73	6.80
9. Student teacher's anxieties concerning cooperating teacher were clearly identified	7.67	7.00	7.08
10. The seminar was designed and organized very well.	9.25	8.86	8.88
11. Overall, the seminar was very valuable.	9.50	9.14	9.19
12. Repetition of seminar for future groups of student teachers is strongly encouraged.	9.50	9.41	9.35

Seminar B-2. This seminar was conducted during the tenth week of the semester and was entitled "Discipline." Please note that a Type A seminar was conducted on the afternoon immediately prior to this Type B seminar. Discipline was a timely topic for this seminar as most of the student teachers were beginning to assume teaching responsibilities in their respective schools. As was the case in seminar B-1, the public school participants also represented different geographic areas, types and sizes of schools. Except for the administrator (principal), all of these individuals graduated from Oklahoma State University in mathematics education. Specifically, one of them was in her first year of teaching and was selected precisely for this reason; another one was serving as a cooperating teacher during the semester.

The specific objectives for the seminar were:

1. Since all behavioral problems are caused, the teacher must be a diagnostician. The seminar participants will be able to identify and offer alternative solutions for classroom behavioral problems which are:
    a. teacher-caused
    b. student-caused
    c. administrator-caused
    d. parent-caused
2. The participants will be able to identify good personal characteristics and effective teacher behaviors specifically related to classroom management.
3. The participants will be able to identify poor personal characteristics and ineffective teacher behaviors specifically related to classroom management.
4. The participants will be able to begin development of his/her own philosophical basis for classroom conduct which minimizes the occurrence of classroom behavioral problems.

Table II summarizes the participants' responses to an evaluation form for the seminar by reporting the means of their responses. As with the evaluation form for seminar B-1, the participants' responses to each statement were reported on a continuum with limits 0 and 10. Since each statement was written positively, participant responses near 0 indicate very strong disagreement with the particular statement while responses near 10 indicate very strong agreement with the statement.

TABLE II

Evaluation of Seminar B-2

Statement	Means of Responses: Public School Participants(4)	Student Teachers(21)	All Participants(25)
1. Seminar objectives were clearly defined.	9.25	8.52	8.64
2. Teacher-caused classroom behavioral problems were clearly identified.	8.50	6.33	6.72
3. Student-caused classroom behavioral problems were clearly identified.	7.00	7.10	7.08
4. Administrator-caused classroom behavioral problems were clearly identified.	8.00	6.43	6.68
5. Parent-caused classroom behavioral problems were clearly identified.	9.00	7.10	7.40
6. Good personal characteristics and effective teacher behaviors were clearly identified.	9.50	7.57	7.88
7. Poor personal characteristics and ineffective teacher behaviors were clearly identified.	9.00	7.38	7.64
8. As a result of this seminar, I can better begin development of a personal philosophy of classroom management.	——	7.57	——
9. The seminar was designed and organized very well.	9.75	8.48	8.68
10. Overall, the seminar was very valuable.	9.75	8.24	8.48
11. Repetition of seminar for future groups of student teachers is strongly encouraged.	10.00	8.52	8.80

Seminar B-3. This seminar was conducted during the twelfth week of the semester and was entitled "Enrichment." Please note that a Type A seminar was conducted on the afternoon prior to this Type B seminar. The public school participants represented different geographic areas, types and sizes of schools with two of them serving as cooperating teachers.

The specific objectives for this seminar were:

1. Be able to identify the role and nature of mathematics enrichment materials.
2. Be able to characterize types and levels of mathematics enrichment materials.
3. Be able to order, organize, and systematically file mathematical enrichment activities.
4. Be exposed to public school mathematics teachers who have demonstrated success with enrichment materials in the areas of vocational mathematics, geometry and computer programming and usage.

The format for this seminar was slightly different, however, than the two Type B seminars which preceded it. Initially, the panel of participants discussed objectives 1, 2, and 3 (listed above). Each participant then gave a short presentation in his/her area—vocational mathematics, computing, geometry.

Table III summarizes the participants' responses to the evaluation form for the seminar by reporting the means of their responses. As with the evaluation forms for the preceding Type B seminars, the participants' responses to each statement were reported on a continuum with limits 0 and 10. Since each statement was written positively, participant responses near 0 indicate very strong disagreement with the particular statement while responses near 10 indicate very strong agreement with the statement.

TABLE III

Evaluation of Seminar B-3

Statement	Means of Responses: Public School Participants(4)	Student Teachers(21)	All Participants(25)
1. Seminar objectives were clearly defined.	9.00	8.38	8.48
2. Role and nature of mathematics enrichment materials were clearly identified.	9.00	7.43	7.68
3. Types and levels of mathematics enrichment activities were clearly characterized.	7.75	7.19	7.28
4. Knowledge of ordering, organizing, and filing activities was very valuable.	7.75	4.95	5.40
5. Presentations concerned with vocational mathematics were very valuable.	9.67 (3)*	8.95	9.04 (24)
6. Presentation concerned with geometry was very valuable.	8.67 (3)*	7.10 (20)*	7.30 (23)
7. Presentation concerned with computing and computer usage was very valuable.	7.00 (3)*	7.43	7.38 (24)
8. The seminar was designed and organized very well.	9.25	7.90	8.12
9. Overall, the seminar was very valuable.	9.50	8.10	8.32
10. Repetition of this seminar for future groups of student teachers is strongly encouraged.	9.50	8.29	8.48

*All means were computed based on the number appearing in the parentheses in the column headings unless a number appears in parentheses to the right of the reported mean. In this case, that number was used.

Seminar B-4. This seminar was conducted during the fifteenth week of the semester and was entitled "Evaluation." As in all preceding Type B seminars, the public school participants represented different geographic areas, types and sizes of schools. One of the participants, an OSU graduate in her first semester of teaching, revealed evaluation problems that a beginning teacher might expect. Another, who was both mathematics teacher and administrator, shared administrative aspects of student evaluation with the seminar.

The specific objectives for this seminar were:

1. Be able to identify basic principles of evaluation.
2. Be able to identify the various aspects and types of student evaluation.
3. Be exposed to four public school mathematics teachers' philosophies of student evaluation.
4. Be able to begin development of a philosophy of student evaluation.

The organization of this seminar was analogous to seminar B-3—panel discussion of objectives 1, 2, and 4 (listed above) involving the public school participants followed by short individual presentations by these individuals.

Table IV summarizes the participants' responses to the evaluation form for the seminar by reporting the means of their responses. As with the evaluation forms for the other Type B seminars, the participants' responses to each statement were reported on a continuum with limits 0 and 10. Since each statement was written positively, participant responses near 0 indicate very strong disagreement with the particular statement while responses near 10 indicate very strong agreement with the statement.

TABLE IV

Evaluation of Seminar B-4

Statement	Means of Responses: Public School Participants(4)	Student Teachers(21)	All Participants(25)
1. Seminar objectives were clearly defined.	8.00	8.80	8.67
2. Several basic principles of evaluation were clearly identified.	8.25	8.25	8.25
3. Several types of student evaluation were clearly identified.	8.00	8.55	8.46
4. Presentations by participants were very valuable.	8.50	8.70	8.67
5. Specifically regarding the development of a philosophy of student evaluation, the seminar was very valuable.	8.75	8.55	8.58
6. The seminar was designed and organized very well.	9.25	8.20	8.38
7. Overall, the seminar was very valuable.	9.50	8.75	8.88
8. Repetition of this seminar to future groups of student teachers is strongly encouraged.	10.00	8.85	9.04

Cumulative Evaluation. During the last Type A seminar the cumulative evaluation of the Type B seminars was administered. Table V included the statements of the cumulative evaluation form and the means of the student teachers' responses. As with all prior evaluation forms, the student teachers' responses to each statement were reported on a continuum with limits 0 and 10. Since each statement was written positively, student teacher responses near 0 indicate very strong disagreement with the particular statement while responses near 10 indicate very strong agreement with the statement.

TABLE V

Cumulative Evaluation

Statement	Mean of Student Teachers' Responses (21)
1. Seminar B-1 (Expectations and Anxieties of Student Teaching) was very valuable.	8.10
2. Seminar B-2 (Discipline) was very valuable.	7.38
3. Seminar B-3 (Enrichment) was very valuable.	6.95 (20)*
4. Seminar B-4 (Evaluation) was very valuable.	8.10 (20)*
5. Overall, this series of seminars was very valuable.	8.10
6. Repetition of this series of seminars to future groups of student teachers is strongly encouraged.	8.71

*All means were computed based on the number appearing in the parentheses in the column heading unless a number appears in parentheses to the right of the reported mean. In this case, that number was used.

IV. Conclusions and Recommendations. The conclusions for each seminar will be discussed individually.

Seminar B-1. It seems to be appropriate to remark at the outset that there were extenuating circumstances surrounding this seminar. Unknown to student teachers and public school participants, plans were made to film this seminar. The plethora of audio and video equipment probably stifled some of the spontaneity and discussion among participants.

According to Table I, the participants indicated the seminar had very clearly defined objectives, was well organized, was very worthwhile, and would strongly recommend it to future groups of student teachers. In the future, student teacher expectations and anxieties concerning the administration and cooperating teachers must be explored more deeply. Lower ratings were indicated in these areas probably due to the fact that

the public school participant panel did most of the talking.

Seminar B-2. According to Table II, the participants indicated the seminar had very clearly defined objectives, was well organized, was very worthwhile and would strongly recommend it to future groups of student teachers. Furthermore, the student teachers indicated that as a result of this seminar they were better prepared to begin development of their own philosophies of classroom management.

More interaction among participants must be encouraged. The researcher believes that the areas of teacher, student and administrator-caused problems would witness higher ratings if more participant interaction existed.

Seminar B-3. Table III reports that the seminar had very clearly defined objectives, was well organized, was very worthwhile, and would be strongly recommended to future groups of student teachers. The participants liked the presentation on vocational mathematics most and the presentation on classical geometry least. Future seminars should place more emphasis on securing, organizing, and filing enrichment materials.

Seminar B-4. According to Table IV, the participants indicated the seminar had very clearly defined objectives, was well organized, was very worthwhile, and would strongly recommend it to future groups of student teachers. Furthermore, the student teachers indicated that as a result of this seminar they were better prepared to begin development of their own philosophies of evaluation.

Cumulative Evaluation. From a general perspective, these student teachers indicated that the seminar series was very valuable and strongly recommend that the series be repeated for future student teachers. More specifically, Seminar B-1 (Expectations and Anxieties of Mathematics Student Teachers) and Seminar B-4 (Evaluation) received the highest ratings; Seminar B-2 (Discipline) and Seminar B-3 (Enrichment) received the next highest ratings, respectively.

Reference

(1) Aichele, D. B. "Understanding Your Student Teacher," Oklahoma Council of Teachers of Mathematics Newsletter, Spring 1972, pp. 6, 7.